Is This Ambulatory Patient a Candidate for Continuous Regional Anesthesia?

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OBJECTIVES

At the conclusion of the PBLD, the discussant will be able to:
1. Identify techniques to provide continuous regional anesthesia
2. Understand the advantages and disadvantages of continuous outpatient regional techniques
3. Choose appropriate candidates for continuous ambulatory regional anesthesia.
4. Identify the considerations in the development of a continuous regional anesthesia program.

STEM CASE - KEY QUESTIONS

A) A 46-year-old married male presents for hardware removal from his ankle. During a previous hospitalization he required overnight admission after a laparoscopic inguinal hernia repair to treat intractable postoperative nausea and vomiting.

B) A 78-year-old woman sustained a radial forearm fracture during a fall, without associated injuries. She lives independently and would like to have her ORIF performed on an ambulatory basis.

C) A 30-year-old female, who lives three hours away from the hospital, presents for shoulder arthroscopy and acromioplasty to repair an impingement syndrome.

Guiding questions for each case:

What would be your anesthetic choice for this patient?
Would a continuous regional anesthetic technique is appropriate?
How would you perform this technique?
Which infusion device would you choose for this patient?
What agent would you use to provide analgesia?
Would multimodal analgesics be of use? If so, which would you choose?

PROBLEM BASED LEARNING DISCUSSION

Popliteal fossa neural blockade with saphenous infiltration has been described as the sole anesthetic technique for outpatient foot and ankle surgery. In a study of 48 patients who received this anesthetic for bunionectomy, open reduction and internal fixation of fractures, ankle ligament repair, Achilles' tendon repair, hardware removal or ankle arthroscopy (all with proximal calf pneumatic tourniquets), analgesia continued for an average of 10 hours postoperatively. No patients required postoperative intravenous analgesics and all reported a high level of satisfaction.[i] This technique preserves contralateral leg strength and ipsilateral hamstring function, and allows immediate post-surgical ambulation with crutches, therefore facilitating early discharge. Now the ability to continue this advantageous anesthetic exists. Ilfeld et al., recently described the use of continuous popliteal blocks for postoperative pain control at home. They randomized 30 patients who underwent painful lower extremity procedures to have continuous analgesia with 0.2% ropivacaine, or placebo. Patients who

received the local anesthetic solution had significantly lower pain scores, fewer episodes of awakening during the evening, and decreased usage of oral analgesics.[ii]

Continuous upper extremity anesthesia and analgesia has also been used successfully in ambulatory patients. Corda and Enneking first described the use of continuous brachial plexus anesthesia in two patients who required postoperative analgesia of the forearm. One underwent hardware removal and needed a postoperative continuous passive motion device, the other had repair of rheumatoid deformities. In both patients analgesia was maintained for greater than 48 hours.[iii] Patient–controlled continuous axillary plexus anesthesia has been described in 60 patients undergoing surgery of the hand. These patients had the opportunity to self-administer 10 mL boluses of anesthetic, as the authors felt that this on-demand technique would permit the individual patient to correct for variations in intensity of pain and duration of analgesia. This technique, using 0.125% ropivacaine, provided excellent analgesia with minimum numbness, and a high degree of patient satisfaction.[iv] A randomized, double-blinded, placebo-controlled study of 30 patients who underwent upper extremity orthopedic procedures under continuous infraclavicular brachial plexus blocks showed the advantages of employing a pump that affords both basal and patient-controlled options. Patients were given continuous infusion of 0.2% ropivacaine at 8 mL/hr with a demand bolus of 2-mL available every 20 minutes. Patients receiving local anesthetic had significantly less postoperative pain than those patients who received saline. The average score of satisfaction with analgesia, on a scale of 0 (dissatisfied) to 10 (very satisfied) in the non-placebo group was 9.2 ± 1.1.[v]

Disposable infusion pumps are available that permit the continuous fixed-rate infusion of local anesthetic through a catheter either into a wound, joint space or fascial sheath. The continuous administration through an elastomeric balloon-type device prevents peaks and troughs of analgesia. Klein, *et al.,* described the use of continuous sciatic analgesia through a catheter placed in the popliteal fossa in two patients undergoing ankle surgery. One patient experienced 32 hours of analgesia after his initial block, while the second patient, who spent one evening in the hospital, had her anesthesia extended, through re-filling of the 270 mL pump, to 50 hours after her initial block.[vi] Grant, *et al*., reviewed the one-year experience of all continuous fixed-rate catheter techniques at an ambulatory surgery center. Two hundred twenty eight patients had either continuous interscalene, axillary, lumbar, femoral or sciatic blocks, with a 94% block success rate. Only 10.9% of patients received opioids in the PACU and 1.7% of patients required treatment for PONV. The majority (90%) of the catheters were patent and functioning at 24 hours postoperatively.[vii]

Portable electronic infusion pumps, which offer both variable rates of continuous infusions and patient-controlled functions, are now small and lightweight. Such a device, with a 550 ml reservoir, was used to deliver 4-days of postoperative analgesia in a 77 year-old woman who underwent rotator cuff repair. Through daily contact with an anesthesiologist, who evaluated the pain scores and number of demand boluses used, the basal rate was decreased from 6 mL/hr to 5 mL/hr on postoperative day 1, and to 4 mL/hr on postoperative day 3.[viii]

While continuous catheter techniques may seem like a panacea for patients undergoing painful peripheral ambulatory surgical procedures, prior to initiating a continuous catheter program, several important issues must be addressed. The risk of pump malfunction/failure or catheter migration/failure exists. These may place patients at risk for toxic reactions to local anesthesia or

conversely inadequate analgesia. Patients should have a continuous chaperone, who understands and confirms the verbal *and* written postoperative instructions that were offered, and who might be able to identify the signs and symptoms of toxicity, should they occur. There must be an anesthesiologist available 24 hours a day to answer questions or manage situations that may arise, and to conduct follow-ups. The issue of catheter discontinuation poses some interesting questions. Patients may feel uncomfortable about discontinuing their catheters, or may not be able to recognize signs of infection, should they occur. Some feel that, just as patients return to their surgeon's offices, to have sutures removed, patients should return for follow-up to the anesthesiologist who placed their catheter. Whereas the elastomeric pumps are single-use, the mechanical ones are expensive and must be returned, which requires a second trip to the site of the surgery. As these types of programs become more common we will continue to look for creative solutions to many of questions and issues that have arisen with this new and exciting postoperative analgesic option.

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